

# ProTech™ Bearing Isolators

## Introduction

Catalog EPS 5350/USA

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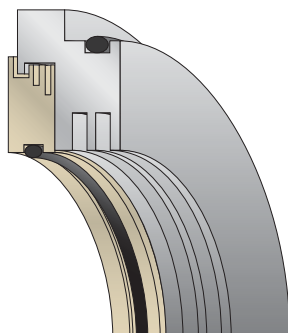


**ProTech Bearing Isolators offer superior protection even in harsh operating environments.**

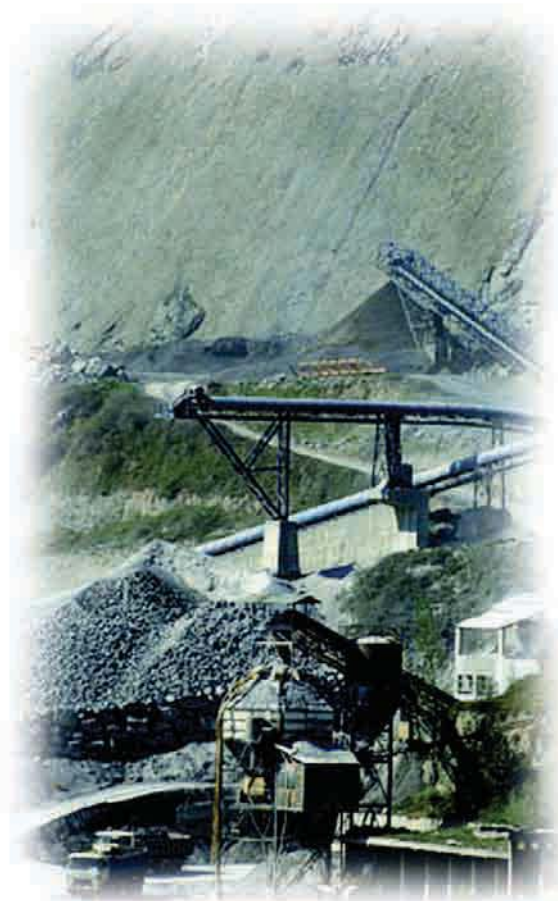
Parker developed the unique ProTech design to provide unmatched two-way sealing for zero lubricant leakage and total exclusion of contaminants. This is accomplished by using non-contact labyrinth seal technology. ProTech features the most effective labyrinth design for both dirt exclusion and oil retention and is far superior to isolators that rely on internal O-rings or other internal seals for sealability. If you want more than just an O-ring for bearing protection — step up to ProTech!



*ProTech Bearing Isolator*



**LS Profile**



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## Applications

### Chemical Resistance Applications

Advanced proprietary PTFE compounds mean ProTech is well suited for caustic environments such as citric acids found in juice processing and strong sulfides in pulp and paper processing. ProTech's superior chemical resistance allows for the standardization of a single material within a plant, eliminating the need to stock duplicate sizes in expensive stainless steel, Hastelloy® or other exotic materials. PTFE is compatible with over 160 chemicals vs. 11 for bronze and 30 for stainless steel.



### Food Processing Applications

ProTech's unique designs and superior performance are "eating the competition's lunch" in the food processing market. The WD is an economical profile for high volume, disposable equipment such as wash down grade motors and drives. It also greatly reduces maintenance costs and downtime in food processing applications such as picker hubs in poultry processing. Anti-microbial and FDA materials are readily available.



### Pumps, Motors and Gearbox Applications

The isolator protection you rely on for protecting bearings in pumps and motors is also available for gearbox applications.

ProTech 360 is a hybrid design that incorporates an outboard labyrinth for contaminant exclusion and PTFE lip technology for positive oil retention, even in vertical down applications. ProTech 360 is used by numerous OEMs for their most demanding gearbox applications.



### Quality Commitment

ProTech is manufactured under strict quality control processes — from raw material selection to finished product. The highest quality and absolute consistency from lot-to-lot are assured by:

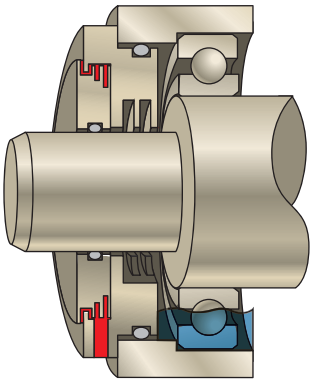
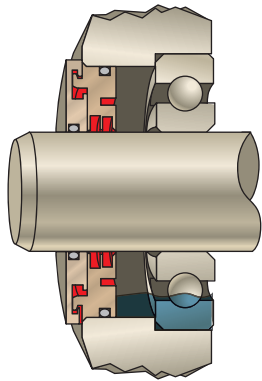
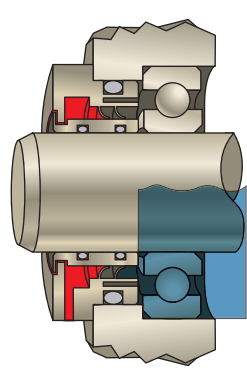
- Our many years of seal manufacturing experience
- Use of only first-grade virgin PTFE resins
- Sophisticated system for controlling critical sintering process
- Specialized CNC production equipment
- QS-9000 certification

**Features and Benefits**

**Table 8-1. Features and Benefits**

Features	Benefits
Non-contact Design	<ul style="list-style-type: none"> <li>• Virtually no torque consumption</li> <li>• Will not wear or groove shafts</li> </ul>
Two-Piece Unitized Construction	<ul style="list-style-type: none"> <li>• Complete exclusion of dust and water</li> <li>• Zero oil leakage</li> <li>• Fewer components and ease of installation</li> </ul>
Accommodates Greatest Axial Movement in Industry	<ul style="list-style-type: none"> <li>• Reduces a major factor causing labyrinth seal leakage</li> </ul>
Fluoroelastomer O-Rings	<ul style="list-style-type: none"> <li>• Static elastomer seal for the most severe services</li> </ul>
No Lubrication Required	<ul style="list-style-type: none"> <li>• Can run dry because of non-contact design</li> </ul>
High Shaft Speeds	<ul style="list-style-type: none"> <li>• Operates far beyond shaft speed limits of standard radial lip seals</li> <li>• Liberal specifications for shaft and bore finish result in low shaft cost</li> </ul>
Precision-Machined Seal	<ul style="list-style-type: none"> <li>• Allows retrofit of most bore and shaft combinations</li> <li>• No tooling charges</li> </ul>

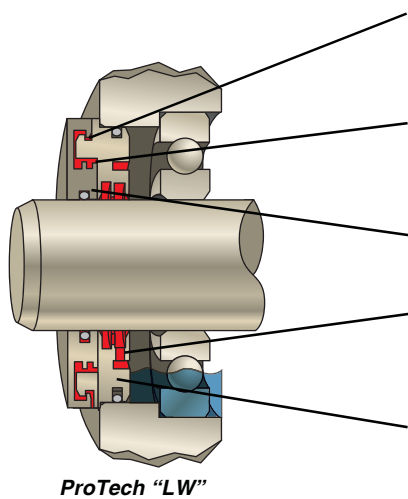
**Product Selection Guide**

ProTech	Millennium	Protech 360
		
<p>ProTech features the most effective labyrinth design for both dirt exclusion and oil retention and is far superior to isolators that rely on internal O-rings or other internal seals for sealability.</p>	<p>The Millennium profile is the first and only metallic isolator that is unitized without internal O-rings or locking rings. Millennium’s patented labyrinth technology does not rely on a simple O-ring for bearing protection.</p>	<p>The ProTech 360 profile is the first and only hybrid isolator designed for flooded oil and oil mist applications. Used by numerous gearbox OEMs as standard equipment, the ProTech 360 features internal dual PTFE lips on an internal stainless steel sleeve for zero shaft wear.</p>



**Sealing System**

Parker’s ProTech design innovations include the first bearing isolator with a two-piece unitized design, complete wrap-around rotor, severe splash oil grooves and a hybrid isolator for flooded applications.



**ProTech “LW”**

- First to offer two-piece unitized construction. Patented design locks seal together and won’t wear like internal O-rings, PTFE elements or other locking rings.
- Contaminant exclusion relies on labyrinth technology, not an internal seal. ProTech does not rely on a simple internal O-ring to protect your bearings.
- Superior chemical resistance provided by proprietary PTFE materials.
- Setting the standard for oil retention. Inboard labyrinth is the most efficient design for retaining oil splash. Far superior to the single groove concept.
- External O-rings provide press fit at shaft and seal housing for zero wear of shaft and housing. Also allows for easy installation.

*First isolator U.L. tested to IEEE 841, meets IP55, IP56, IP66, IP69k and API 610.*

**Table 8-2. IEEE IP Ratings**

First Numeral	Protection Against Foreign Objects (Dust)	Second Numeral	Protection Against Water
0	None	0	None
1	Solid objects > 50 mm (large)	1	Vertically falling drip water
2	Solid objects > 12.5 mm (medium)	2	Vertically falling drip water tipped up to 15° from its normal position
3	Solid objects > 2.5 mm (small)	3	Atomized water
4	Solid objects > 1 mm (grain-type)	4	Spray water
5	Dust protected	5	Hose-directed water
6	Dust-proof	6	Strong water jets
		7	Dipped in water
		8	Submerged in water
		9k	High pressure water spray (1160 to 2320 psi [80 to 160 bar]) from spray nozzle located 4 inches (102 mm) away from seal

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# ProTech™ Bearing Isolators Engineering

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## Troubleshooting

The time to reduce or eliminate seal failure is before it happens. In many instances, factors beyond the seal manufacturer's control determine the seal's performance. The following check lists will help identify possible causes of seal failure and suggest remedies.



*Failed Seal Resulting from  
Improper Fit*



*Failed Seal Resulting from  
Improper Installation*

## Application Check List

1. Is the correct size seal being utilized?
2. Is the most suitable seal profile being utilized?
3. Are the service media and the temperature compatible with the seal material?
4. Are the equipment conditions, such as the shaft to bore misalignment, shaft finish, and bore finish within recommended limits?
5. Do any unusual equipment variables exist which might affect overall seal performance?

## Installation Check List

1. Has the seal been damaged in storage or handling?
2. Have the O-rings been properly lubricated prior to installation?
3. Have the O-rings been damaged by passing over sharp keyway, splines, threads or burrs?
4. Have the O-rings "rolled" or "twisted"?
5. Has the seal been installed perpendicular to the bore and shaft centerline?
6. Has an adequate vent been provided to relieve all internal pressure?
7. Has adequate drainage been provided to prevent excessive oil build-up over the bottom of the shaft?
8. Have you verified whether a false flooded condition exists?

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**Table 8-3. Troubleshooting Guide**

Trouble Sign	Possible Source	Suggested Remedy
Seal OD Leakage	Housing bore too rough, pitted, severe corrosion, grooved, etc.	Improve finish to recommended limits. (See <b>Page 8-13.</b> )
	Insufficient OD O-ring fit	Measure bore diameter, compare to nominal required dimensions of equipment and seal requirements.
	Seal OD O-ring damaged during installation	Protect O-ring from all sharp burrs at leading edge of bore. A chamfer should be used on leading edges. Lubricate O-rings prior to installation. (See <b>Page 8-12.</b> ) Care should also be used when storing the seal for future usage.
	Seal OD O-ring damaged from chemical incompatibility	Consult chemical compatibility chart in <b>Appendix H.</b> (FKM is the standard ProTech O-ring material unless specified otherwise.)
Seal ID Leakage	Shaft surface too rough — pitted, severe corrosion, grooved, etc.	Improve finish to recommended limits. (See <b>Page 8-13.</b> )
	Insufficient ID O-ring fit	Verify shaft diameter, compare to nominal required dimensions of equipment and seal requirements. Verify nominal seal dimensions match actual shaft diameter.
	Seal ID O-ring damaged during installation	Protect O-ring from all sharp burrs at leading edge of shaft. A chamfer should be used on leading edges. (See <b>Page 8-12.</b> ) Care should also be used when storing the seal. To prevent cutting, protect ID O-rings from shaft keyways, splines, etc. Use proper installation tools to prevent seal O-ring damage.
	Seal ID O-ring damaged from chemical incompatibility	Consult chemical compatibility chart in <b>Appendix H.</b> (FKM is the standard ProTech O-ring material unless specified otherwise.)
Seal Leakage from Drain Port	Internal pressure present	Vent housing if possible. If vented, verify breather or pressure limiting device is functioning correctly. Up to 5 psi, upgrade seal design to ProTech 360.
	ProTech 360 only, internal pressure > 5 psi	Vent housing if possible. If vented, verify breather or pressure limiting device is functioning correctly.
	Internal seal failure	Contact Parker Application Engineering.
Seal Leakage from between Rotor and Stator	Oil level too high	Lower oil level. Ensure internal oil drains are adequate. Upgrade seal design to ProTech 360.
	Internal pressure present	Vent housing if possible. If vented, verify breather or pressure limiting device is functioning correctly. Up to 5 psi, upgrade seal design to ProTech 360.
	ProTech 360 only, internal pressure > 5 psi	Vent housing if possible. If vented, verify breather or pressure limiting device is functioning correctly.
	Internal seal failure	Contact Parker Application Engineering.

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## ProTech™ Bearing Isolators

### Design Engineering

The important considerations in selecting a bearing isolator are:

- For best oil splash retention, avoid designs that use simple inboard oil grooves.
- For long term performance, select a design that does not rely on an internal seal such as an O-ring, V-ring or other internal component to achieve sealability.
- For best contaminant exclusion, select a seal that is purposely designed to control laminar flow.
- Avoid designs that require special installation tools. The easier the seal is to install, the less chance seal damage will occur during installation.
- Select a material that will not introduce harmful dusting into the bearing cavity.

### Further Considerations

- Determine what impact upgrading to a bearing isolator will have on the total cost of sealing based on return on investment (ROI).
- Standardize on a material that provides the broadest chemical compatibility throughout your facility.
- Avoid designs that are sold on features that are not scientifically sound.
- Select a manufacturer that has extensive knowledge in the science of sealing and is an industry leader in design innovation.
- Ask the manufacturer for documented copies of test results for IP55, IP56, IP66 and IP69k that have been conducted by third parties (such as U.L.) in order to verify performance claims.

### Upgrading to Bearing Isolators

The cost of downtime in today's manufacturing environment has been the primary driver behind the decision of companies to convert key equipment such as pumps, motors, gear boxes and split pillow block bearings from a standard lip seal to a bearing isolator type seal.

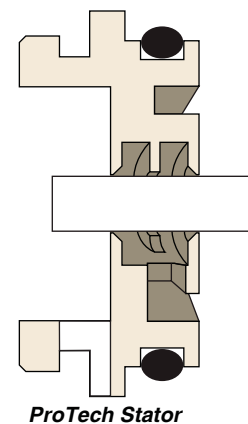
While the initial cost of a lip seal is much lower than a bearing isolator, the total cost of the sealing system over the life of the equipment should be evaluated as part of the decision-making process. Bearing isolators are able to extend the Mean Time Between Failure (MTBF) because true non-contact isolators will never wear out as compared to standard lip seals that have a typical life of 3,000 to 5,000 hours. Bearing isolators permanently exclude contaminants, which means the seal is no longer the limiting factor for the bearing approaching the L10 life rating stated by the bearing manufacturer. The primary cost savings are a result of fewer rebuilds and less unplanned downtime over the life of the equipment. Additional savings result from lower torque consumption meaning less energy consumption and lower maintenance costs. Energy savings alone can offset the costs of the upgrade.

Once the decision has been made to upgrade to bearing isolators, the next step is to select a bearing isolator design. The two basic design types are contact and non-contact. The contact design relies on an internal seal for excluding contaminants while the non-contact design relies on labyrinth technology and provides zero wearing components. ProTech Bearing Isolators are non-contact.

The ProTech bearing isolator consists of two components, a rotor and a stator.

### Stator

An external O-ring at the ProTech stator OD maintains a press fit in the seal housing and provides a static seal for oil retention. Because this is a static seal, it will not wear out over time.



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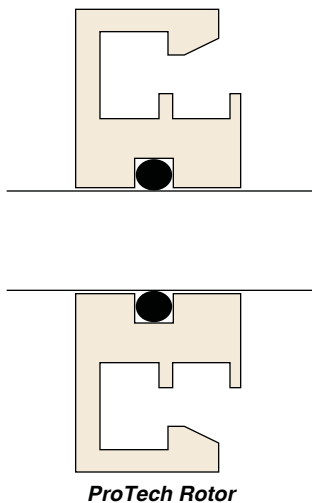
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The O-ring press fit allows for easy seal installation while also providing excellent bore retention. The press fit will withstand a torque of up to 500 in-ounces (36,000 g-cm) to eliminate spinning in the housing. The press fit has been tested in the vertical down position to ensure the stator will not walk out of the seal bore.

The stator has a sophisticated series of grooves to retain oil splash. Before ProTech, bearing isolators relied on a single inboard groove for oil retention. Results from independent testing by a major pump OEM showed Parker's design to be the most effective for oil retention when compared to various competitor designs.

**Rotor**

The second component, the rotor, uses an external O-ring to maintain a static press fit on the shaft. Since the rotor spins with the shaft, it will not wear, groove or damage the shaft, so the costs associated with having to recondition the sealing surface of the shaft are eliminated. The wrap-around profile of the ProTech rotor provides optimal water exclusion.

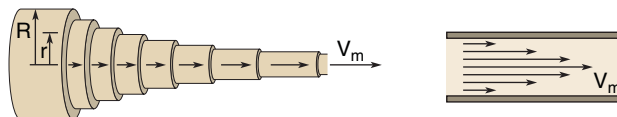


The rotor and stator are assembled at the Parker factory where they are permanently unitized by means of a patented process. The unitized design allows for one-piece installation and maintains a minimal clearance between the rotor and stator interface for the life of the seal. This interface is the first line of defense against contamination. A unitized design maintains the seal's integrity by keeping high-pressure water spray, vibration or axial movement from separating or increasing the gap between the rotor and stator.

**Controlling Laminar Flow**

ProTech relies on true non-contact labyrinth seal technology. When the rotor and stator are assembled at our factory, a true non-contact labyrinth is created. For successful water

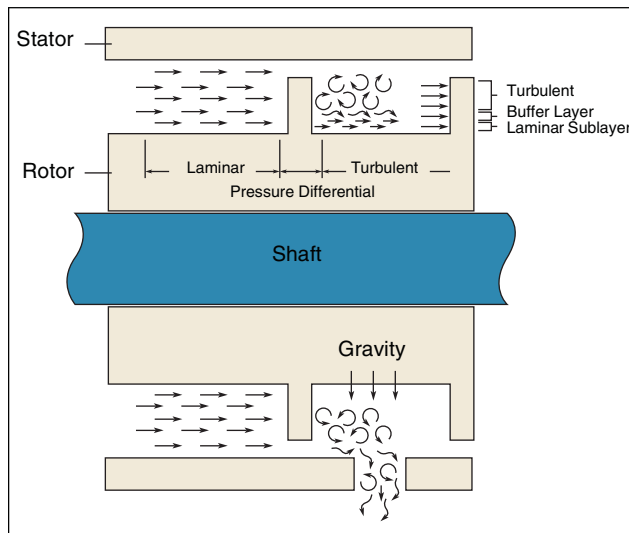
exclusion, the labyrinth must control the laminar flow properties of the liquid entering the seal. Laminar is the flow of a liquid in an organized layered manner, or as the name suggests laminates. A liquid flowing through a pipe has various flow levels ranging from zero at the outer wall to a maximum along the centerline.



*Typical Laminar Flow Pattern*

**Introduction of Turbulence**

An effective seal design must introduce turbulence into the flow. Turbulence slows down the rate of flow of the liquid so that gravity alone is enough to expel the liquid through the seal drain port. The left side of **Figure 8-1** depicts the faster moving laminar flow. The arrows show how the individual water molecules line up in even planes. The right side shows that while laminar flow is still present close to the seal wall, most of the fluid is a slower moving turbulent flow. The direction change, pressure differential, plus the friction of the molecules themselves, aid in slowing the rate of flow.

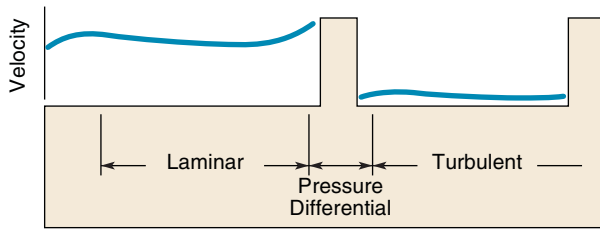


**Figure 8-1. Effects of Turbulence**

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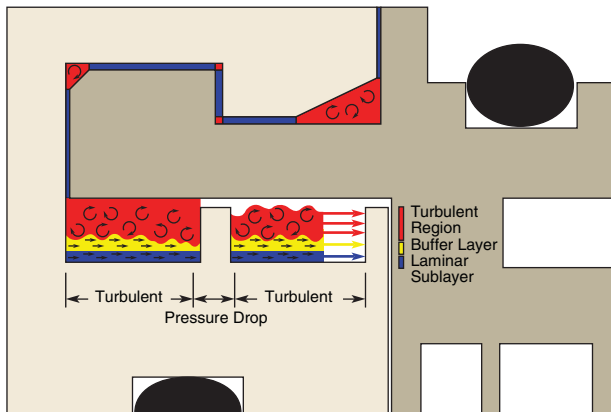


**ProTech™ Bearing Isolators**



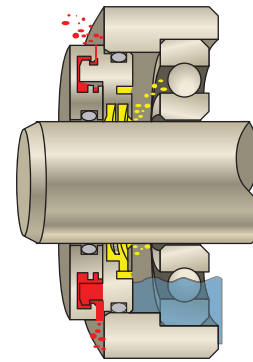
**Introduction of Turbulence Reduces the Rate of Flow**

ProTech's effectiveness is due to the number of times turbulence is introduced to the flow through either forcing a change in direction or dropping the pressure that is pushing the fluid, by using pressure differential chambers. As fluid passes from a smaller restriction to a larger restriction, it undergoes a significant pressure drop. With a decrease in the energy pushing the fluid, the velocity of the fluid will also decrease. ProTech forces any fluid that enters the seal through 11 different directions and 4 pressure differential chambers.



**Pressure Drops and Turbulence**

Extra care must be taken during the design process to avoid introducing features that will contribute to laminar flow. Designs that rely on directional changes alone and use smooth wall channels tend to take out previously introduced turbulence and convert the flow back to laminar. Such designs are easy to spot because they must incorporate an internal component, typically an O-ring, in an attempt to match ProTech's performance.

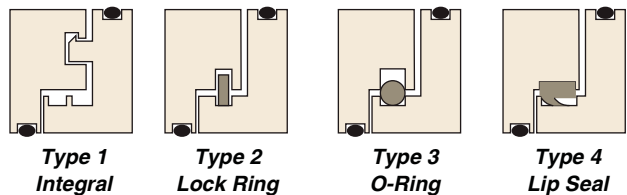


**Flow Patterns**

*The graphic shows the flow pattern of contaminants in red. The lubricant flow pattern is in yellow.*

A brand new seal that incorporates an internal O-ring may do very well in performance testing. However, the internal seal is a contacting seal that will wear over time. Testing indicates that leakage will occur in less than 400 hours of run time. The internal seal acts as a dam that is holding back a pool of contaminants. As soon as there is a break in the contact, due to wear or the slightest axial movement, the pooled contaminants will flood into the bearing housing. The internal seal is also very susceptible to severe wear from abrasive contaminants. Sludge deposits also make the internal seal inoperable. Designs which rely on internal seals are incapable of excluding even mild water spray if the internal seal is removed.

Depicted below are some of the common designs that are available today and they can be defined by the unitization method that is used.



Parker's ProTech is modeled after the Type 1 unitization method which is integrally unitized and a true non-contact design. There are no internal components to wear or damage the seal. Because there are no internal components to wear, performance will not diminish over time.

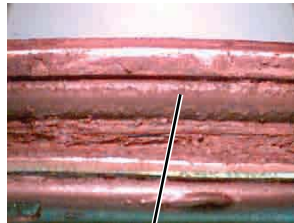
Type 2 uses an internal locking ring to unitize the seal. It is typically a ring made from nylon or other plastic material.



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Types 3 and 4 use internal locking rings with a dual purpose. Not only do they unitize the seal, they also provide the majority of the sealing function. Type 3 uses an internal O-ring and Type 4 uses a contact lip seal made of PTFE. If you remove these internal components, the designs will not function. As these components wear, the seal performance will diminish over time. Internal seals have a limited life due to wear caused by axial shaft movement and chemical attack. Over time the operating temperature will harden the internal seal, making it less effective.

The purpose of internal components can also be negated by contamination. The photo at right shows an internal O-ring that is locked into a groove by contamination, completely negating its intended purpose. Abrasive contaminants will also cause severe wearing of internal components.



*Internal  
Compromised O-Ring*

Because internal seals are not precision balanced components, they can oscillate or wobble at speed. This can create an action that pumps contamination into the bearing housing. The photo at right shows a stream of water being pumped directly into the bearing cavity by a bearing isolator design that uses an internal O-ring as the primary seal.



*Water Being Pumped into  
the Bearing Cavity*

Parker's ProTech line of bearing isolators feature a true non-contact design (Type 1) and do not rely on an internal O-ring as the primary seal. Additional internal seals simply are not needed with a proper labyrinth design.

## Materials

Material is also an important consideration. ProTech uses advanced proprietary PTFE compounds making it well suited for harsh environments such as citric acids found in juice processing and strong caustics such as sulfides in pulp and paper processing. ProTech's superior chemical resistance allows for the standardization of a single material within a plant, eliminating the need to stock duplicate sizes in expensive stainless steel, Hastelloy® or other exotic materials. Standard chemical compatibility charts recommend PTFE for 160 chemicals versus 11 for bronze and 30 for stainless steel.

ProTech and a leading metallic isolator were soak tested in sulfuric acid. After 30 days the metallic isolator was heavily corroded, the O-rings had disintegrated and the rotor and stator were locked together.

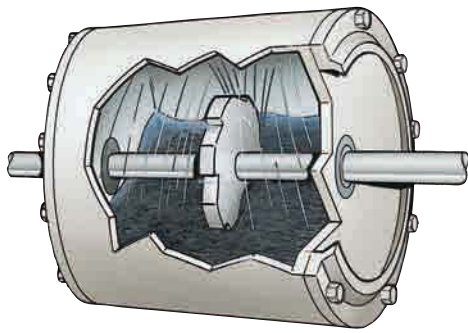


*ProTech vs. metallic isolator  
after soaking 30 days in acid*

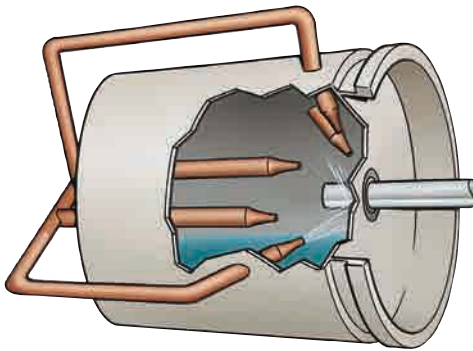
ProTech showed zero signs of any harmful effects and could be installed in an application with no performance issues. The temperature range for standard material is -40 to +250°F (-40 to +121 °C). Higher temperature applications can be handled with alternate materials.

Another important material consideration is the result of initial seal break-in. During initial start-up, it is very common to have slight contact between the rotor and stator. This is a result of the axial shaft movement that occurs as the equipment reaches operating speed. The axial movement at operating speed can force the seal's stator and rotor into contact with each other. The contact will create a dusting of the seal material until a sufficient amount of material has been removed so that the rotor and stator are no longer wearing against each other. The primary concern is this material will find its way into the bearing cavity. With a metallic material, the bearing is contaminated with a dust that has a detrimental effect on bearing life. With ProTech, the dusting is a fine PTFE material, free of glass and other abrasive fillers, that does not have any harmful effects on bearing life or performance. It can be argued that PTFE actually enhances lubrication.

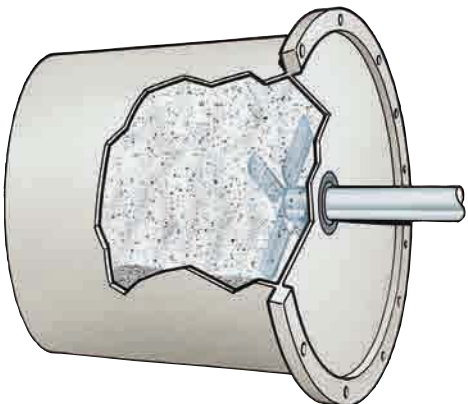
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Oil Leakage Test



Water Exclusion Test



Dust Exclusion Test

## Testing and Validation

Laboratory testing has significant advantages over field testing. The lab effectively compresses time and more easily explores limits. Before ProTech saw its first field test, it was put through laboratory tests far more severe than conditions ever encountered in the field. ProTech’s effectiveness is also validated by independent laboratory testing.

Both ProTech and competitive seals were subjected to three extreme in-house tests with ProTech clearly emerging as the seal of choice.

### 1. Oil Leakage Test

ProTech and other seals were subjected to critical oil seal testing using a machine built to SAE J110 standards. One-hundred hour tests were conducted with severe oil splash.

### 2. Water Exclusion Test

The test machine was modified by mounting five nozzles at various positions relative to the exterior of the seal to simulate severe external wash down. Using water at pressures of 30 to 62 psi (2.0 to 4.3 bar), these nozzles individually sprayed each seal from a distance of 3" in both a static mode and while the shaft rotated at various speeds up to 3525 RPM. The nozzles tried to force water past the seal for nearly two hours.

### 3. Dust Exclusion Test

The test machine was modified with an enclosed chamber containing a large quantity of fine dust and sand which was vigorously agitated with the chamber attached to the outside of each seal area. The equipment operated at speeds up to 3525 RPM for a period of 70 hours in an environment that was literally a dense dust storm.

## Conclusions

ProTech was the only seal that passed all three torture tests. In addition to lab testing, field trials confirm ProTech’s performance superiority.

Table 8-4. Extreme Test Results

Material: Expulsion Method: Design Type: Brand	PTFE Single-Port 2-Pc. Unitized Parker	Bronze Single-Port 2-Pc. Non-Unitized Brand A	PTFE Multi-Port 3-Pc. Unitized Brand B	Bronze Single-Port 3-Pc. Unitized Brand C
Oil Leak Test	PASS	Fail	Pass	Fail
Water Pressure Test	PASS	Fail	Fail	Fail
Dust Test	PASS	Pass	Fail	Fail

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## Installation

### Standard Design Installation

The ProTech seal is unitized; any attempt to disassemble the seal will damage it. After making any adjustments to the equipment, confirm that the seal is still properly installed.

#### Prior to Installation

1. **Warning!** Disconnect all system power, and follow all standard safety procedures.
2. Remove all sharp edges from the following:
  - a. Lead-in chamfers
  - b. Keyway
  - c. Splines
  - d. Snap ring grooves
3. Clean all foreign debris from bore and shaft areas.

#### Installation

1. Lubricate bore and shaft O-rings with system-compatible lubricant.
2. Position the seal over the shaft by hand. Seal position is correct if the stator O-ring is towards the seal housing as shown.
3. Slide seal down the shaft, stopping just before the seal housing of the equipment. Use hand pressure only.
4. Rotate the seal so that the drain port is centered at the six o'clock position. Press seal into bore using hand pressure only. If necessary, gently tap seal into bore using a soft-faced tool.



*Position the Seal*



*Installing the Seal*

DO NOT USE A METALLIC HAMMER OR PUNCH as this may damage the seal.

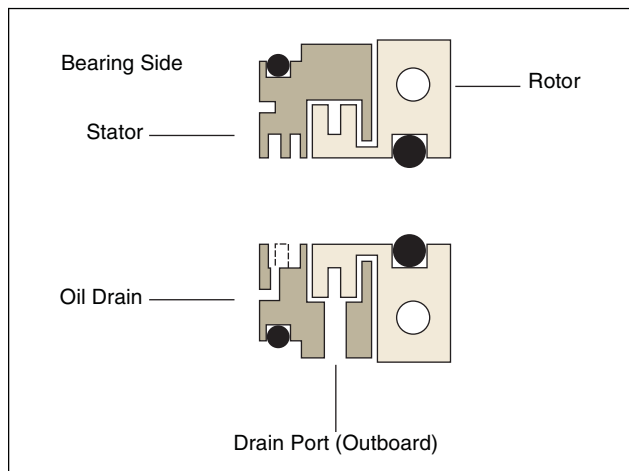
### Split Seal Installation

#### Prior to Installation

1. **Warning!** Disconnect all system power and follow all standard safety procedures.
2. Remove sharp edges on the shaft and bore where the seal will be installed. Make sure there are proper lead-in edges.
3. Clean all foreign debris from the bore and shaft area.

#### Installation

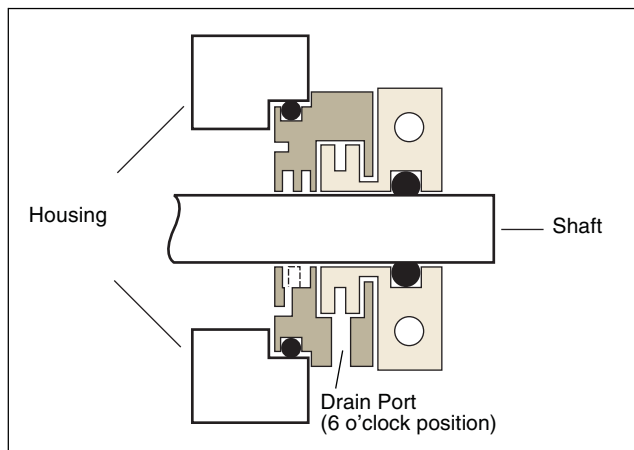
1. Pre-lubricate the O-rings with a system-compatible lubricant.
2. Position the shorter O-ring on the shaft and place the two halves of the rotor, with the flange sides facing away from the bore, over the O-ring so the O-ring fits into the groove (see **Fig. 8-2**). (It might help to first paste the O-ring to the shaft with a light coat of grease.) Then place the screws in the rotor halves and screw the two halves together loosely. Do not tighten the screws.



**Figure 8-2. Position the Rotor Halves**

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- Place the two halves of the stator over the rotor at the bore side so they interlock with the rotor. Rotate the stator until the drain port is at the six o'clock position. While holding the parts together by hand, wrap the long O-ring into the stator O-ring groove with the ends of the O-ring meeting at the 12 o'clock position. Gently slide the seal into the bore while keeping the O-ring in the groove (see **Fig. 8-3**).



**Figure 8-3. Proper Installation**

- Gently tighten the screws; stopping a few times to make sure that the shaft can turn freely. Tighten the screws so the halves of the rotor meet. Do not turn the screws more than one eighth turn beyond where the halves meet. **DO NOT OVER-TIGHTEN THE SCREWS.**

After making any adjustments to the equipment, confirm that the seal is still properly installed.

### Hardware Considerations

The design of ProTech and Millennium bearing isolators use the compression of O-rings to maintain a press fit of the rotor to the shaft and the stator to the bore. This ensures there is no relative motion or wear between the seal and housing components.

Due to lack of dynamic sealing surface, finish conditions are not as critical as they would be with a rotary lip seal.

The most common material for shafts is steel. For seal bores common materials are steel, cast iron and aluminum. ProTech and Millennium may be used with a broader range of materials, such as non-ferrous metals and plastics, that meet the application needs.

### Bores

No special heat treat is required.

Surface finish of 32  $\mu\text{in Ra}$  (0.81  $\mu\text{m Ra}$ ) is preferred but 64  $\mu\text{in Ra}$  (1.6  $\mu\text{m Ra}$ ) in many cases can be tolerated.

Lead-in chamfer is required — 0.032 to 0.063" (0.81 to 1.6 mm) x 30° with no sharp edges.

### Shafts

No special heat treat is required.

Surface finish of 32  $\mu\text{in Ra}$  (0.81  $\mu\text{m Ra}$ ) is preferred but 64  $\mu\text{in Ra}$  (1.6  $\mu\text{m Ra}$ ) in many cases can be tolerated.

Shaft lead is not an issue, so ground finish is not required.

Total eccentricity including runout or whip is 0.020" (0.51 mm) T.I.R. for most standard designs. The ProTech 360 design can handle up to 0.003" (0.08 mm). Special designs can tolerate much more.

**Table 8-5. Tolerances**

Shaft Tolerance	
Shaft Speeds — fpm (m/s)	Under 5000 (25)
Shaft Diameters — Inches (mm)	All Diameters
LSE, LSM, LNE, LNM, LME, LMM, LWE, LWM, LXE, LXM, LDE, LDM, LBE, LBM, SLE, SLM, WDE, WDM, MLE, MLM, MNE, MNM, FSE, FSM, FNE, FNM	$\pm .002$ (0.05)
Bore Tolerance	
Cavity Bore Diameter — Inches (mm)	All Diameters
LSE, LSM, LNE, LNM, LME, LMM, LWE, LWM, LXE, LXM, LDE, LDM, LBE, LBM, SLE, SLM, WDE, WDM, MLE, MLM, MNE, MNM, FSE, FSM, FNE, FNM	$\pm .002$ (0.05)



# ProTech™ Bearing Isolators Materials

Catalog EPS 5350/USA

## Unmatched Corrosion Resistance

Advanced proprietary PTFE compounds mean ProTech is well suited for caustic environments such as citric acids found in juice processing and strong sulfides in pulp and paper processing.



ProTech's superior chemical resistance allows for the standardization of a single material within a plant, eliminating the need to stock duplicate sizes in expensive stainless steel, Hastelloy or other exotic materials. PTFE is compatible with over 160 chemicals vs. 11 for bronze and 30 for stainless steel.

## Seal Materials

### PTFE Materials

#### **-1 — 20210 Proprietary Graphite Filled PTFE**

Graphite filled PTFE, offers low wear, low coefficient of friction, a superior material for dynamic applications.

#### **-2 — 20999 Food Grade (FDA) Mineral Filled PTFE**

Mineral filled PTFE that meets FDA requirements to achieve improved wear and longer life. White in color.

#### **-5 — 20113 Proprietary Graphite Filled PTFE**

Proprietary filled PTFE, offers low wear and exceptional thermal stability. Used in larger diameters where bore retention is critical.

#### **-7 — 20995 Anti Microbial PTFE**

Proprietary filled PTFE that meets FDA requirements approved for dairy contact, offers superior wear characteristics that exceed other materials used in dynamic food and drug processing equipment applications. White in color. Material contains anti microbial additive that prevents growth of bacteria.

#### **-8 — 20990 FDA 3A PTFE**

Mineral filled PTFE that meets FDA requirements to achieve: improved wear, longer life and FDA clearance. White in color. Meets 3A sanitary standards for USDA food and dairy product contact.

### Metallic

#### **-B — Bronze C93200 (SAE 660)**

The most popular bronze bearing material, SAE 660, is particularly suited for medium to relatively high speeds. SAE 660 provides good hardness, strength and wear resistance; excellent anti-frictional qualities and good conformability. Excellent machining properties.



**Metallic Millennium  
Bearing Isolator**

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**-S — 304 Stainless Steel**

Corrosion Resistance: Excellent... exceeding that of Type 302 in a wide variety of corrosive media including hot petroleum products, steam combustion gasses. Frequently used in the food and beverage industry which requires a high degree of sanitation and cleanliness.

**316 Stainless Steel**

Corrosion Resistance: Good resistance to a wider range of chemicals than Type 304. Highly resistant to the complex sulphur compounds used in pulp and paper processing. Also resists attack of marine and corrosive industrial atmospheres. This type is also highly resistant to pitting and withstands corrosive actions of acids, dyes, and salts used in the process, textile and pulp industries. Applications include the manufacture of pumps, valves, textile and chemical equipment.

**Carbon Steel**

Corrosion resistance: Poor with no corrosion treatment. Minimum physical properties of 36,000 psi yield strength and 58,000 psi tensile strength. Applications include a wide variety of industrial equipment.

**Table 8-6. Standard Seal Material Temperature Range**

Matl. Code	Material	Min. Temp	Cont. Temp.	Peak Temp.
-1	20210 Proprietary Graphite Filled PTFE	-40 °F	250 °F	250 °F
		-40 °C	121 °C	121 °C
-2	20999 (Food Grade FDA) Mineral Filled PTFE	-40 °F	250 °F	250 °F
		-40 °C	121 °C	121 °C
-5	20113 Proprietary Graphite Filled PTFE	-40 °F	250 °F	250 °F
		-40 °C	121 °C	121 °C
-7	20995 Anti Microbial PTFE	-40 °F	250 °F	250 °F
		-40 °C	121 °C	121 °C
-8	20990 FDA 3A PTFE	-40 °F	250 °F	250 °F
		-40 °C	121 °C	121 °C
-B	Bronze C93200 (SAE 660)	-40 °F	400 °F	400 °F
		-40 °C	204 °C	204 °C
-S	304 Stainless Steel	-40 °F	400 °F	400 °F
		-40 °C	204 °C	204 °C
Special	316 Stainless Steel	-40 °F	400 °F	400 °F
		-40 °C	204 °C	204 °C
Special	Carbon Steel	-40 °F	400 °F	400 °F
		-40 °C	204 °C	204 °C

Note: Other materials and custom compounding available. Contact Parker for more information.

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## O-Ring Materials

### **-1 — Fluorocarbon (FKM)**

Fluorocarbon (FKM) has excellent resistance to high temperatures, ozone, oxygen, mineral oil, synthetic hydraulic fluids, fuels, aromatics and many organic solvents and chemicals. Special FKM compounds exhibit an improved resistance to acids, fuels, water and steam.

### **-2 — Fluorosilicone (FVMQ)**

FVMQ contains trifluoropropyl groups next to the methyl groups. The mechanical and physical properties are very similar to VMQ. However, FVMQ offers improved fuel and mineral oil resistance but poor hot air resistance when compared with VMQ.

### **-3 — Acrylonitrile-Butadiene (NBR)**

Nitrile rubber (NBR) is the general term for acrylonitrile butadiene terpolymer. Higher acrylonitrile content NBR has better resistance to oil and fuel, good mechanical properties and high wear resistance. Lower acrylonitrile content NBR has better elasticity and resistance to compression set, weathering and ozone.

### **-4 — Tetrafluoroethylene-Propylene (AFLAS®)**

This elastomer is a copolymer of tetrafluoroethylene (TFE) and propylene. Its chemical resistance is excellent across a wide range of aggressive media.

### **-5 — Ethylene Propylene Rubber (EPM, EPDM)**

EPM is a copolymer of ethylene and propylene. Ethylenepropylene-diene rubber (EPDM) is produced using a third monomer and is particularly useful when sealing phosphate-ester hydraulic fluids and in brake systems that use fluids having a glycol base.

### **-6 — Silicone Rubber (Q, MQ, VMQ, PVMQ) FDA**

The term silicone covers a large group of materials in which vinyl-methyl-silicone (VMQ) is often the central ingredient. Silicone elastomers as a group have relatively low tensile strength, poor tear and wear resistance. Silicones have good heat resistance, good cold flexibility and good ozone and weather resistance as well as good insulating and physiologically neutral properties.



Table 8-7. O-Ring Materials Properties

Code	O-Ring Material	Heat Resistance	Cold Flexibility	Chemical Resistance	Not Compatible with:
-1	Fluorocarbon (FKM)	Up to 400 °F (204 °C) and higher temperatures with shorter life expectancy.	Down to -15 °F (-26 °C) (some to -40 °F [-40 °C]).	<ul style="list-style-type: none"> <li>Mineral oil and grease, low swelling in ASTM oil No. 1, and IRM 902 and IRM 903 oils.</li> <li>Non-flammable hydraulic fuels in the group HFD.</li> <li>Silicone oil and grease.</li> <li>Mineral and vegetable oil and grease.</li> <li>Aliphatic hydrocarbons (fuel, butane, propane, natural gas).</li> <li>Aromatic hydrocarbons (benzene, toluene).</li> <li>Chlorinated hydrocarbons (trichlorethylene and carbon tetrachloride).</li> <li>Fuels, also fuels with methanol content.</li> <li>High vacuum.</li> <li>Very good ozone, weather and aging resistance.</li> </ul>	<ul style="list-style-type: none"> <li>Glycol based brake fluids.</li> <li>Ammonia gas, amines, alkalis.</li> <li>Superheated steam.</li> <li>Low molecular organic acids (formic and acetic acids).</li> </ul>
-2	Fluorosilicone (FVMQ)	Up to 350 °F (177 °C) max.	Down to approximately -100 °F (-73 °C).	<ul style="list-style-type: none"> <li>Aromatic mineral oils (IRM 903 oil).</li> <li>Fuels.</li> <li>Low molecular weight aromatic hydrocarbons (benzene, toluene).</li> </ul>	
-3	Acrylonitrile-Butadiene (NBR)	Up to 212 °F (100 °C) with shorter life @ 250 °F (121 °C).	Depending on individual compound, between -30 °F and -70 °F (-34 °C and -57 °C).	<ul style="list-style-type: none"> <li>Aliphatic hydrocarbons (propane, butane, petroleum oil, mineral oil and grease, diesel fuel, fuel oils) vegetable and mineral oils and greases.</li> <li>HFA, HFB and HFC fluids.</li> <li>Dilute acids, alkali and salt solutions at low temperatures.</li> <li>Water (special compounds up to 212 °F [100°C]).</li> </ul>	<ul style="list-style-type: none"> <li>Fuels of high aromatic content (for flex fuels a special compound must be used).</li> <li>Aromatic hydrocarbons (benzene).</li> <li>Chlorinated hydrocarbons (trichlorethylene).</li> <li>Polar solvents (ketone, acetone, acetic acid, ethyleneester).</li> <li>Strong acids.</li> <li>Brake fluid with glycol base.</li> <li>Ozone, weather and atmospheric aging.</li> </ul>
-4	Tetrafluoroethylene-Propylene (AFLAS®)	Up to approximately 450 °F (232 °C).	Down to approximately 25 °F (-4 °C).	<ul style="list-style-type: none"> <li>Bases.</li> <li>Phosphate Esters.</li> <li>Amines.</li> <li>Engine Oils.</li> <li>Steam.</li> <li>Pulp and paper liquors.</li> </ul>	<ul style="list-style-type: none"> <li>Aromatic fuels.</li> <li>Ketones.</li> <li>Carbon Tetrachloride.</li> </ul>
-5	Ethylene Propylene Rubber (EPM, EPDM)	Up to 302 °F (150 °C) (max. 400 °F (204 °C) in water and/or steam).	Down to approximately -70 °F (-57 °C).	<ul style="list-style-type: none"> <li>Hot water and steam up to 300 °F (149 °C) with special compounds up to 400 °F (204 °C).</li> <li>Glycol based brake fluids up to 300 °F (149 °C).</li> <li>Many organic and inorganic acids.</li> <li>Cleaning agents, soda and potassium alkalis.</li> <li>Phosphate-ester based hydraulic fluids (HFD-R).</li> <li>Silicone oil and grease.</li> <li>Many polar solvents (alcohols, ketones, esters).</li> <li>Ozone, aging and weather resistant.</li> </ul>	<ul style="list-style-type: none"> <li>Mineral oil products (oils, greases and fuels).</li> </ul>
-6	Silicone Rubber (Q, MQ, VMQ, PVMQ) FDA	Up to approximately 400 °F (204 °C) (special compounds up to 450 °F (232 °C).	Down to approximately -65 °F (-54 °C). With special compounds down to -175 °F (-115 °C).	<ul style="list-style-type: none"> <li>Engine and transmission oil (e.g.: ASTM oil No.1).</li> <li>Animal and vegetable oil and grease.</li> <li>Brake fluid (non-petroleum base).</li> <li>Fire-resistant hydraulic fluid, HFD-R and HFD-S.</li> <li>High molecular weight chlorinated aromatic hydrocarbons (including flame-resistant insulators, and coolant for transformers).</li> <li>Moderate water resistance.</li> <li>Diluted salt solutions.</li> <li>Ozone, aging and weather resistant.</li> </ul>	<ul style="list-style-type: none"> <li>Superheated water steam over 250 °F (121 °C).</li> <li>Acids and alkalis.</li> <li>Low molecular weight chlorinated hydrocarbons (trichloroethylene).</li> <li>Aromatic mineral oil.</li> <li>Hydrocarbon based fuels.</li> <li>Aromatic hydrocarbons (benzene, toluene).</li> </ul>

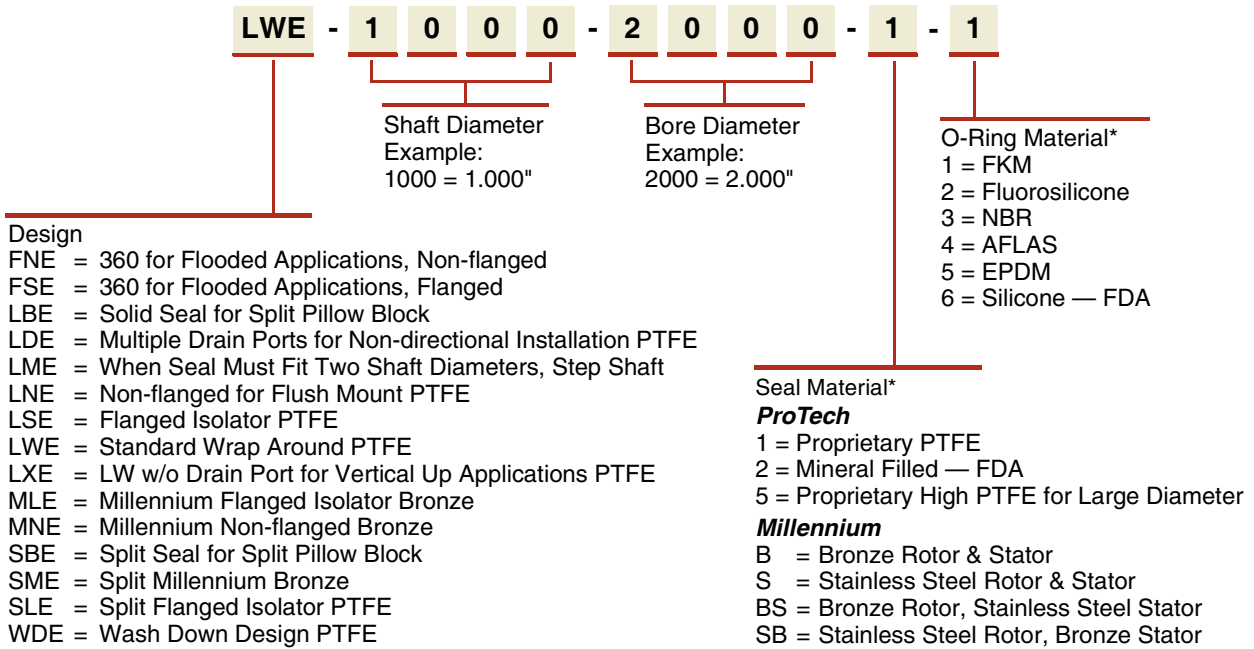
# ProTech™ Bearing Isolators

## Product Engineering

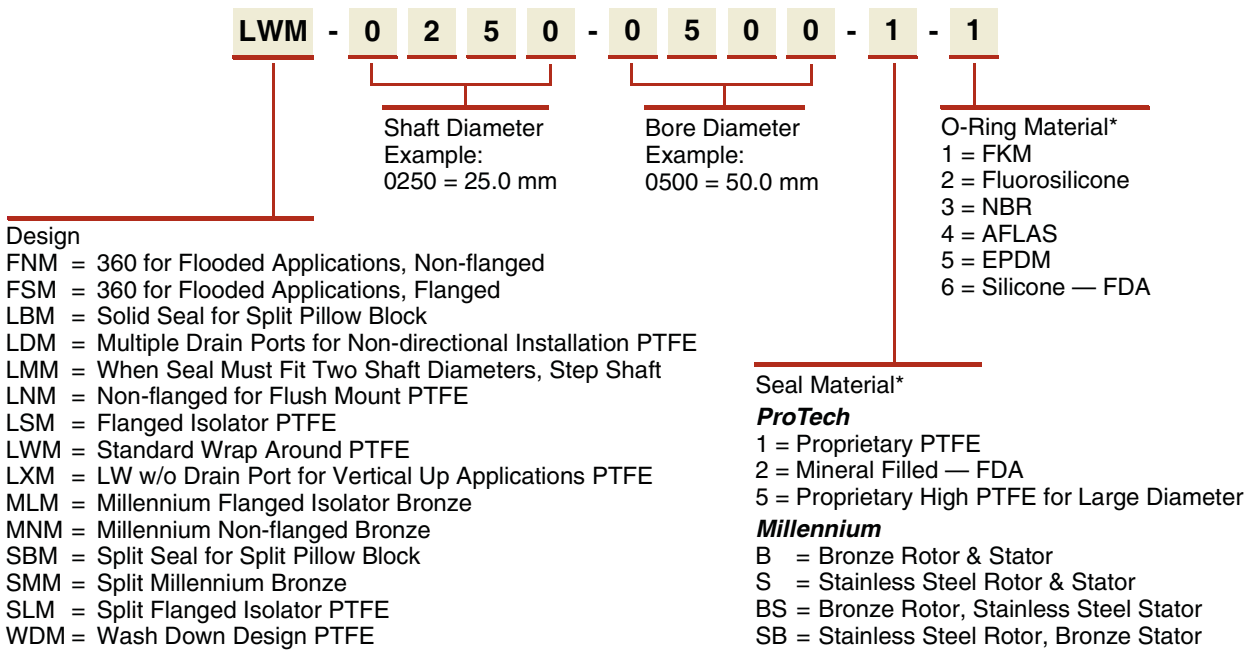
Catalog EPS 5350/USA

### Part Number Nomenclature — ProTech

#### English



#### Metric



\*Specials have Alphanumeric suffix here in place of material and O-ring code, example "AG31".

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**ProTech™ Bearing Isolators**

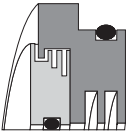
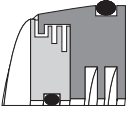
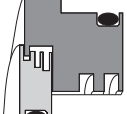
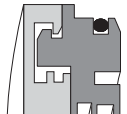
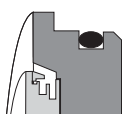
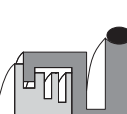
**Product Line**

ProTech is available in multiple designs to meet specific design requirements and geometry constraints.

- Available with or without flange to provide labyrinth sealing in restricted widths.
- Single and multiple expulsion ports available when directional installation is a problem.
- Exceeds IEEE-841 to provide premium bearing protection on severe-duty electric motors.
- New split pillow block design meets OEM specifications.

**Profiles**

**Table 8-8. Product Profiles**

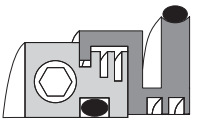
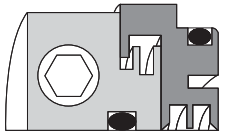
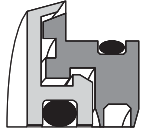
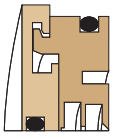
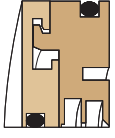
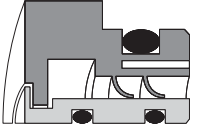
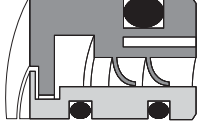
Series	Features	Applications	Page
<b>LS</b> 	<b>Flanged</b> — General purpose sealing in flanged design. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-22</b>
<b>LN</b> 	<b>Non-flanged</b> — Specifically designed for flush mount applications. General purpose sealing in non-flanged design. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-23</b>
<b>LM</b> 	<b>Step Shaft</b> — Specifically designed to accommodate step shaft application. Flanged designs. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>See note below.</b>
<b>LW, LX</b> 	<b>Wrap Around</b> — Specifically designed for heavier water spray exclusion. Vertical up optional design is "LX," same as "LW" but with no drain port. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-25</b>
<b>LD</b> 	<b>Multi Port</b> — For use in applications where drain port cannot be fixed at six o'clock position. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>See note below.</b>
<b>LB</b> 	<b>Pillow Block</b> — Solid seal design for sealing split pillow block bearings. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Drop in replacement for LER ring for split pillow block bearings. Easily interchanged by LER number and shaft diameter.	<b>8-24</b>

Note: LM Series: Call engineering for step shaft applications.  
 LD Series: Call engineering for multi-port applications.

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**Table 8-8. Product Profiles (Continued)**

Series	Features	Applications	Page
<b>SB</b> 	<b>Pillow Block</b> — Split seal design for sealing split pillow block bearings. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Drop in replacement for LER ring for split pillow block bearings. Easily interchanged by LER number and shaft diameter.	<b>8-24</b>
<b>SL</b> 	<b>Split</b> — Split design for field retrofits where equipment can not be uncoupled or disassembled. Requires no wear sleeves or shaft refurbishment. PTFE material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-27</b>
<b>WD</b> 	<b>Wash Down</b> — Wash down purpose in narrow flanged designs. PTFE material. Specifically designed to exclude high pressure water spray and dry contaminants in limited space applications. For grease retention.	Small disposable electric motors and equipment for food processing industry. Economical for 140 & 480 frame IEEE 841 electric motors.	<b>8-26</b>
<b>ML</b> 	<b>Flanged Millennium</b> — Specifically designed for heavier water spray exclusion. Bronze material. Also excludes dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-29</b>
<b>MN</b> 	<b>Non-flanged Millennium</b> — Specifically designed for flush mount applications. General purpose sealing in non-flanged design. Bronze material. Excludes heavy water spray and dry contaminants from the bearing cavity. Retains grease and oil splash (oil level must be below inboard oil drain-back or non-flooded).	Electric motors, pumps, mixers, gear boxes, blowers and custom equipment.	<b>8-30</b>
<b>FS</b> 	<b>Flanged 360</b> — Specifically designed for oil flooded and oil mist applications. Maximum 5 psi (0.3 bar) internal pressure. PTFE material with stainless steel rotor. Excludes heavy water spray and dry contaminants from the bearing cavity.	Electric motors, pumps, mixers, gear boxes, blowers, cooling towers, aerators and custom equipment. Oil mist lubrication systems.	<b>8-31</b>
<b>FN</b> 	<b>Non-flanged 360</b> — Specifically designed for oil flooded and oil mist applications where seal must be flush mounted. Maximum 5 psi (0.3 bar) internal pressure. PTFE material with stainless steel rotor. Excludes heavy water spray and dry contaminants from the bearing cavity.	Electric motors, pumps, mixers, gear boxes, blowers, cooling towers, aerators and custom equipment. Oil mist lubrication systems.	<b>8-32</b>

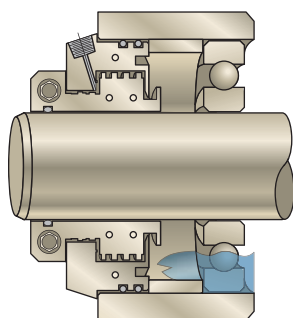
Product Data

Table 8-9. Profile Properties

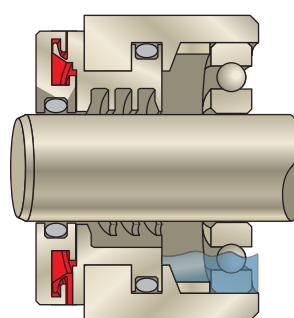
Series	Maximum Shaft Dynamic Runout (TIR)	Maximum Axial Movement	Maximum Shaft to Bore Misalignment (STBM)	Maximum Pressure	Maximum Shaft Surface Speed
LS, LN	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 5,000 fpm (25 m/s)
LM	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 5,000 fpm (25 m/s)
LW, LX	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 3,000 fpm (15 m/s)
LD	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 5,000 fpm (25 m/s)
LB	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 5,000 fpm (25 m/s)
SL	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 3,000 fpm (15 m/s) <i>Contact Factory for Speeds Over 3,000 fpm (15 m/s)</i>
WD	0.020" (0.51 mm)	0.020" (0.51 mm) <i>Special Designs Available</i>	± 0.020" (± 0.51 mm) <i>Special Designs Available</i>	0	Up to 3,000 fpm (15 m/s) <i>Contact Factory for Speeds Over 3,000 fpm (15 m/s)</i>
ML, MN	0.010" (0.25 mm)	0.010" (0.25 mm) <i>Special Designs Available</i>	± 0.010" (± 0.25 mm) <i>Special Designs Available</i>	0	Up to 7,000 fpm (35 m/s)
FS, FN	0.003" (0.08 mm)	0.003" (0.08 mm) <i>Special Designs Available</i>	± 0.005" (± 0.13 mm) <i>Special Designs Available</i>	5 psi (0.3 bar)	Up to 5,000 fpm (25 m/s) <i>Contact Factory for Speeds Over 3,000 fpm (15 m/s)</i>

Custom Design Examples

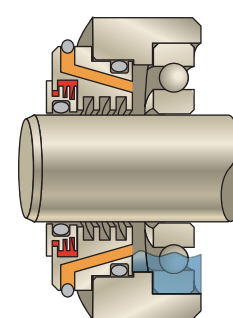
Parker can configure custom bearing isolator designs to fit most applications. Contact Parker's application engineers for design assistance.



Split Air Purge



Turbine



Grease Purge



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# ProTech™ Bearing Isolators

## Pro ile

Catalog EPS 5350/USA

### LS — Flanged Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity, best for vertical down applications

Equipment: Motors, pumps, mixers, gearboxes, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 5,000 fpm (25 m/s)

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial, FDA 3A

### O-Ring Material

Standard: FKM

Optional: NBR, FDA silicone, EPDM, Aflas®†

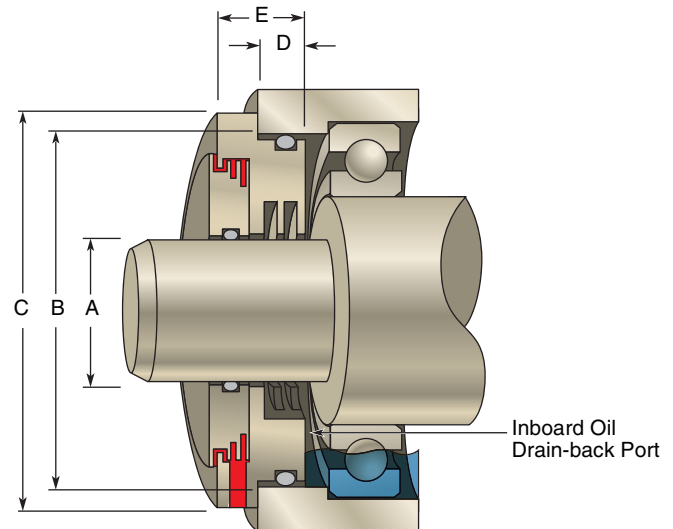
† Aflas® is a registered trademark of Asahi Glass Co.

**Table 8-10. LS Mounting and Lubrication**

	Mounting		Lubrication		
	Position		Grease	Oil	Dry
Horizontal	Y		Y	Y	Y
Vertical Up	Y*		Y	Y	Y
Vertical Down	Y		Y	N	Y

\* If contaminant level is heavy see LW Profile on Page 8-25.

### Dimensions — LS Profile



**Table 8-11. LSE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
LSE	0.500 – 3.000	0.626 – 1.500	0.250	0.313	0.688
LSE	3.001 – 4.000	0.626 – 1.500	0.250	0.375	0.750
LSE	4.001 – 6.000	0.874 – 1.500	0.250	0.375	0.750
LSE	6.001 – 10.000 <sup>2</sup>	0.874 – 1.500	0.250	0.438	0.815

**Table 8-12. LSM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
LSM	12.0 – 40.0	10.0 – 40.0	6.0 <sup>1</sup>	7.0	16.0
LSM	40.1 – 60.0	12.0 – 40.0	6.0 <sup>1</sup>	8.0	17.0
LSM	60.1 – 80.0	15.0 – 40.0	6.0 <sup>1</sup>	9.0	18.0
LSM	80.1 – 130.0	20.0 – 40.0	6.0	9.0	18.0
LSM	131.0 – 254.0 <sup>2</sup>	24.0 – 40.0	6.0	11.0	20.0

<sup>1</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>2</sup> Contact factory for requirements outside of standard dimensions listed above.  
Note: Cross-Section = (Bore – Shaft) / 2

**Important:** For a listing of popular sizes, see **Appendix F**.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### LN — Flush Mount Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Applications requiring seal to be flush mounted to equipment housing. Motors, pumps, mixers, gearboxes, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 5,000 fpm (25 m/s)

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial, FDA 3A

### O-Ring Material

Standard: FKM

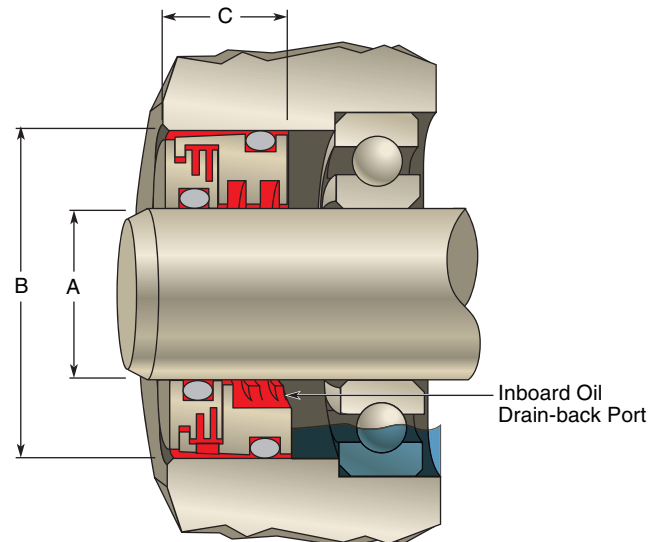
Optional: NBR, FDA silicone, EPDM, Atlas®

**Table 8-13. LN Mounting and Lubrication**

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	NR*	Y	Y	Y
Vertical Down	Y	Y	N	Y

\* Not recommended (NR). If contaminant level is heavy see LW Profile on **Page 8-25**.

### Dimensions — LN Profile



**Table 8-14. LNE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" In Bore Depth
LNE	0.500 – 4.000	0.750 – 1.500	0.562
LNE	4.001 – 10.000 <sup>1</sup>	0.874 – 1.500	0.625

**Table 8-15. LNM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" In Bore Depth
LNM	12.0 – 80.0	14.0 – 40.0	10.0
LNM	80.1 – 130.0	16.0 – 40.0	12.0
LNM	131.1 – 250.0 <sup>1</sup>	18.0 – 40.0	15.0

<sup>1</sup> Contact factory for requirements outside of standard dimensions listed above.  
Note: Cross-Section = (Bore – Shaft) / 2

**Important:** For a listing of popular sizes, see **Appendix F**.



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# ProTech™ Bearing Isolators

## B B Profiles

Catalog EPS 5350/USA

### LB, SB — Split Pillow Block Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity. Excellent for taconite exclusion

Equipment: Drop-in replacement for LER seal. Available as a solid or split seal. Easily interchanged by LER No. and shaft diameter. Contact authorized distributor for complete interchange

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 5,000 fpm (25 m/s)

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial, FDA 3A

### O-Ring Material

Standard: FKM

Optional: NBR, FDA silicone, EPDM, Atlas®

Table 8-16. LB Mounting and Lubrication

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	Y	Y	Y	Y
Vertical Down	Y	Y	N	Y

### Dimensions — LB Profile

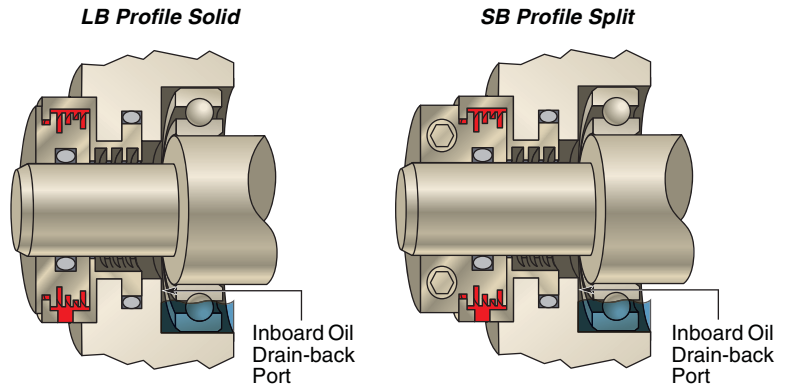


Table 8-17. Solid Seal Interchange for Split Pillow Block

Housing	Shaft	LER	ProTech Part No.
SAF 211, 209, 212, 309, 311, 513	2-1/4	30	LBE-2250-2823-J64
SAF 210, 310	2-3/8	35	LBE-2375-2948-M07
SAF 213, 313, 515, 615	2-7/16	37	LBE-2438-3188-D96
SAF 213, 313, 515, 615	2-1/2	38	LBE-2500-3188-J61
SAF 211, 311	2-9/16	40	LBE-2563-3198-K90
SAF 215, 312, 314, 516, 616	2-5/8	43	LBE-2625-3563-AI58
SAF 215, 312, 314, 516, 616	2-11/16	44	LBE-2688-3563-D97
SAF 215, 312, 314, 516, 616	2-3/4	45	LBE-2750-3563-R52
SAF 213, 216, 313, 517	2-15/16	53	LBE-2938-3813-B77
SAF 520, 620	3-7/16	102	LBE-3438-4460-C65
SAF 317, 522, 622	3-15/16	109	LBE-3938-4960-D98
SAF 220, 224, 320, 324, 526, 626	4-7/16	117	LBE-4438-5543-D36
SAF 222, 226, 322, 326, 528, 625	4-15/16	122	LBE-4938-5980-E29
SAF 224, 228, 324, 328, 530, 630	5-5/16	127	LBE-5313-6375-C97
SAF 532, 632	5-7/16	130	LBE-5438-6750-E30
SAF 232, 332, 534, 634	5-15/16	140	LBE-5938-7343-E92
SAF 234, 334, 536	6-7/16	148	LBE-6437-7780-E45
SAF 332, 336, 538, 638	6-15/16	224	LBE-6938-8282-K52
SAF 238, 338, 540, 640	7-5/16	228	LBE-7313-8570-G56
SAF 234, 240, 334, 340	7-7/16	161	LBE-7438-8945-D02

**Important:** Partial list only. Please call factory for additional interchanges.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### LW — Wrap Around Design

Retain: Grease and oil splash  
(operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Motors, pumps, mixers, gearboxes, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 3,000 fpm  
(15 m/s)<sup>1</sup>

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F  
(-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002"  
(± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial,  
FDA 3A

### O-Ring Material

Standard: FKM

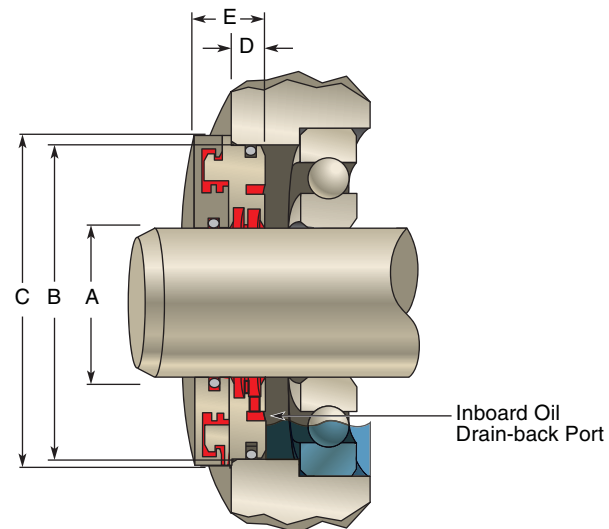
Optional: NBR, FDA silicone, EPDM,  
Aflas®

**Table 8-18. LW Mounting and Lubrication**

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	Y*	Y	Y	Y
Vertical Down	Y	Y	N	Y

\* Optional LX Profile (w/o drain port) recommended.

### Dimensions — LW Profile



**Table 8-19. LWE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
LWE <sup>2</sup>	0.492 – 1.575	0.394 – 1.575	0.236 <sup>3</sup>	0.276	0.630
LWE <sup>2</sup>	1.576 – 2.362	0.472 – 1.575	0.236 <sup>3</sup>	0.315	0.669
LWE <sup>2</sup>	2.363 – 3.150	0.630 – 1.575	0.236 <sup>3</sup>	0.354	0.709
LWE	3.151 – 5.118	0.866 – 1.575	0.236	0.354	0.709
LWE	5.119 – 10.000 <sup>4</sup>	0.945 – 1.575	0.236	0.433	0.787

**Table 8-20. LWM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
LWM <sup>2</sup>	12.5 – 40.0	10.0 – 40.0	6.0 <sup>3</sup>	7.0	16.0
LWM <sup>2</sup>	40.1 – 60.0	12.0 – 40.0	6.0 <sup>3</sup>	8.0	17.0
LWM <sup>2</sup>	60.1 – 80.0	15.0 – 40.0	6.0 <sup>3</sup>	9.0	18.0
LWM	80.1 – 130.0	20.0 – 40.0	6.0	9.0	18.0
LWM	130.1 – 254.0 <sup>4</sup>	24.0 – 40.0	6.0	11.0	20.0

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> Shaft diameters under 1.575" (40 mm) and cross-sections under 0.433" (11 mm) have standard inboard oil splash grooves.  
Note: Cross-Section = (Bore – Shaft) / 2

<sup>3</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>4</sup> Contact factory for requirements outside of standard dimensions listed above.

**Important:** For a listing of popular sizes, see **Appendix F**.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### WD — Wash Down Motor Design (Meets IP69k)

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Small disposable motors and equipment for food processing industry; economical seal for 140 and 180 frame motors and other high volume OEM equipment requiring wash down protection where cost to upgrade the seal has been a deterrent.

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 3,000 fpm (15 m/s)<sup>1</sup>

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial, FDA 3A

### O-Ring Material

Standard: FKM

Optional: NBR, FDA silicone, EPDM, Atlas®

Table 8-21. WD Mounting and Lubrication

	Mounting		Lubrication		
	Position	Grease	Oil	Dry	
Horizontal	Y	Y	N	Y	
Vertical Up	Y	Y	N	Y	
Vertical Down	Y	Y	N	Y	

### Dimensions — WD Profile

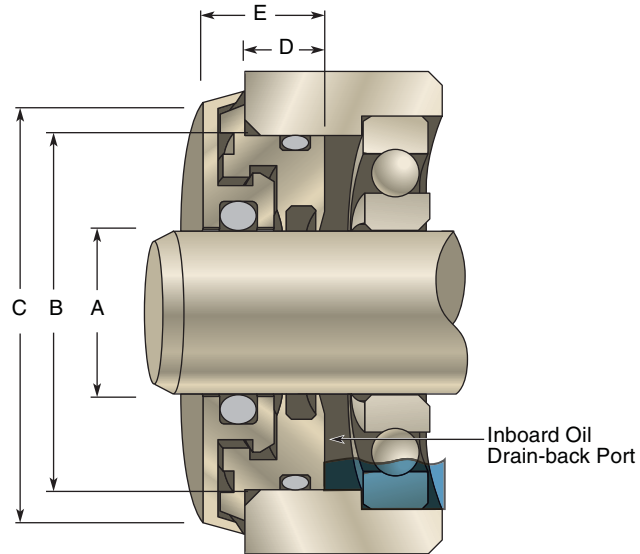


Table 8-22. WDE Standard Dimensions — Inch/Fractional

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
WDE	0.492 – 1.575	0.551 – 1.575	0.269 <sup>2</sup>	0.248	0.373
WDE	1.576 – 2.362	0.669 – 1.575	0.269 <sup>2</sup>	0.248	0.373
WDE	2.363 – 3.150	0.787 – 1.575	0.269 <sup>2</sup>	0.287	0.412
WDE	3.151 – 5.118	0.866 – 1.575	0.269	0.287	0.412
WDE	5.119 – 10.000 <sup>3</sup>	0.945 – 1.575	0.269	0.287	0.412

Table 8-23. WDM Standard Dimensions — Metric

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
WDM	12.5 – 40.0	14.0 – 40.0	6.8 <sup>2</sup>	6.3	9.5
WDM	40.1 – 60.0	17.0 – 40.0	6.8 <sup>2</sup>	6.3	9.5
WDM	60.1 – 80.0	20.0 – 40.0	6.8 <sup>2</sup>	7.3	10.5
WDM	80.1 – 130.0	22.0 – 40.0	6.8	7.3	10.5
WDM	130.1 – 254.0 <sup>3</sup>	24.0 – 40.0	6.8	7.3	10.5

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>3</sup> Contact factory for requirements outside of standard dimensions listed above.  
Note: Cross-Section = (Bore – Shaft) / 2

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### SL — Split Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: For field retrofits where equipment cannot be uncoupled or disassembled. Requires no wear sleeves or shaft refurbishment. Motors, pumps, mixers, gearboxes, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 3,000 fpm (15 m/s)<sup>1</sup>

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE

Optional: Food grade, Anti microbial, FDA 3A

### O-Ring Material

Standard: FKM

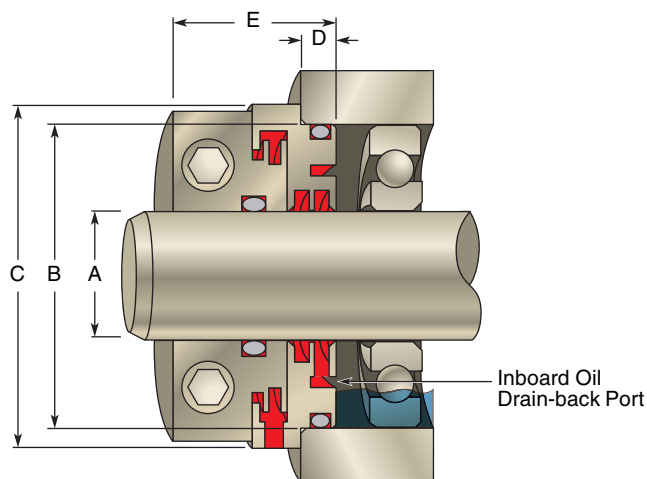
Optional: NBR, FDA silicone, EPDM, Aflas®

**Table 8-24. SL Mounting and Lubrication**

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	Y	Y	Y	Y
Vertical Down	Y*	Y	N	Y

\* Locking collar may be required.

### Dimensions — SL Profile



**Table 8-25. SLE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
SLE <sup>2</sup>	0.492 – 1.575	0.394 – 1.575	0.236 <sup>3</sup>	0.276	1.078
SLE <sup>2</sup>	1.576 – 2.362	0.472 – 1.575	0.236 <sup>3</sup>	0.315	1.117
SLE <sup>2</sup>	2.363 – 3.150	0.551 – 1.575	0.236 <sup>3</sup>	0.354	1.156
SLE	3.151 – 5.118	0.787 – 1.575	0.236 <sup>3</sup>	0.354	1.257
SLE	5.119 – 10.000 <sup>4</sup>	0.945 – 1.575	0.236 <sup>3</sup>	0.433	1.436

**Table 8-26. SLM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
SLM <sup>2</sup>	12.5 – 40.0	10.0 – 40.0	6.0 <sup>3</sup>	7.0	27.4
SLM <sup>2</sup>	40.1 – 60.0	12.0 – 40.0	6.0 <sup>3</sup>	8.0	28.4
SLM <sup>2</sup>	60.1 – 80.0	14.0 – 40.0	6.0 <sup>3</sup>	9.0	29.4
SLM	80.1 – 130.0	20.0 – 40.0	6.0 <sup>3</sup>	9.0	31.9
SLM	130.1 – 254.0 <sup>4</sup>	24.0 – 40.0	6.0 <sup>3</sup>	11.0	36.5

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> Shaft diameters under 1.575" (40 mm) and cross-sections under 0.433" (11 mm) have standard inboard oil splash grooves.  
Note: Cross-Section = (Bore – Shaft) / 2

<sup>3</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>4</sup> Contact factory for requirements outside of standard dimensions listed above.

**Important:** Contact factory for available sizes.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### SM — Split Millennium Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must remain below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: For field retrofits where equipment can not be uncoupled or disassembled. Requires no wear sleeves or shaft refurbishment. Motors, pumps, mixers, gearboxes, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.020" (0.51 mm)

Shaft Speed: Up to 3,000 fpm (15 m/s)<sup>1</sup>

Pressure: 0 psi/bar

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.020" (0.51 mm)  
Special designs up to 0.070" (1.78 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Bronze

Optional: 302 SS, 304 SS, 316 SS, Carbon Steel

### O-Ring Material

Standard: FKM

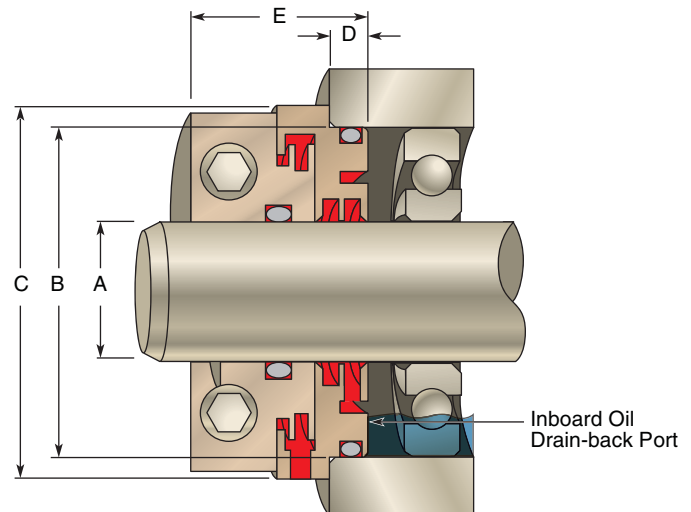
Optional: NBR, FDA silicone, EPDM, Aflas®

**Table 8-27. SM Mounting and Lubrication**

	Mounting		Lubrication		
	Position	Grease	Oil	Dry	
Horizontal	Y	Y	Y	Y	
Vertical Up	Y	Y	Y	Y	
Vertical Down	Y*	Y	N	Y	

\* Locking collar may be required.

### Dimensions — SM Profile



**Table 8-28. SME Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
SME <sup>2</sup>	0.610 – 1.575	0.709 – 1.575	0.236 <sup>3</sup>	0.276	1.078
SME	1.576 – 2.362	0.709 – 1.575	0.236 <sup>3</sup>	0.315	1.117
SME	2.363 – 3.150	0.709 – 1.575	0.236 <sup>3</sup>	0.354	1.156
SME	3.151 – 5.118	0.787 – 1.575	0.236 <sup>3</sup>	0.354	1.257
SME	5.119 – 10.000 <sup>4</sup>	0.945 – 1.575	0.236 <sup>3</sup>	0.433	1.436

**Table 8-29. SMM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
SMM <sup>2</sup>	15.5 – 40.0	18.0 – 40.0	6.0 <sup>3</sup>	7.0	27.4
SMM	40.1 – 60.0	18.0 – 40.0	6.0 <sup>3</sup>	8.0	28.4
SMM	60.1 – 80.0	18.0 – 40.0	6.0 <sup>3</sup>	9.0	29.4
SMM	80.1 – 130.0	20.0 – 40.0	6.0 <sup>3</sup>	9.0	31.9
SMM	130.1 – 254.0 <sup>4</sup>	24.0 – 40.0	6.0 <sup>3</sup>	11.0	36.5

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> Shaft diameters under 1.575" (40 mm) and cross-sections under 0.433" (11 mm) have standard inboard oil splash grooves.  
Note: Cross-Section = (Bore – Shaft) / 2

<sup>3</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>4</sup> Contact factory for requirements outside of standard dimensions listed above.

**Important:** Contact factory for available sizes.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### ML — Flanged Millennium Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Gearboxes, motors, pumps, mixers, turbines, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.010" (0.25 mm)

Shaft Speed: Up to 7,000 fpm (35 m/s)

Pressure: 0 psi/bar

Temperature Range: -40 to 400 °F (-40 to 204 °C)

Axial Movement: 0.010" (0.25 mm)  
Special designs up to 0.100" (0.05 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Bronze

Optional: 302 SS, 304 SS, 316 SS, Carbon Steel

### O-Ring Material

Standard: FKM

Optional: NBR, FDA silicone, EPDM, Aflas®

Table 8-30. ML Mounting and Lubrication

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	Y*	Y	Y	Y
Vertical Down	Y	Y	N	Y

\* Optional MX Profile (w/o drain port) recommended.

### Dimensions — ML Profile

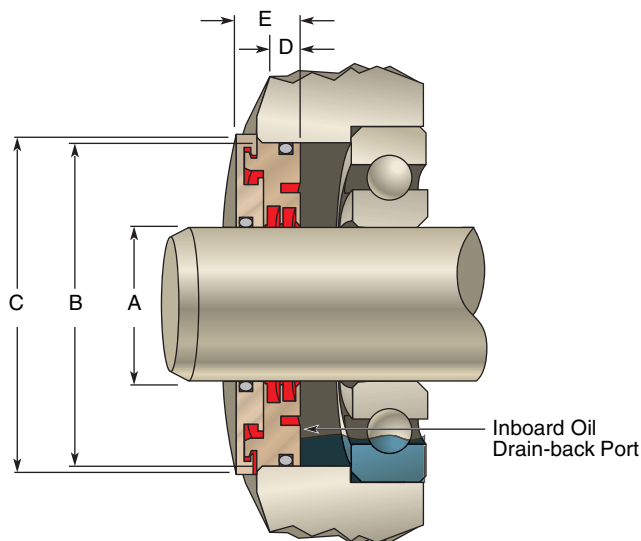


Table 8-31. MLE Standard Dimensions — Inch/Fractional

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
MLE <sup>1</sup>	0.610 – 1.575	0.394 – 1.575	0.236 <sup>2</sup>	0.276	0.551
MLE <sup>1</sup>	1.576 – 2.362	0.472 – 1.575	0.236 <sup>2</sup>	0.315	0.591
MLE <sup>1</sup>	2.363 – 3.150	0.630 – 1.575	0.236	0.354	0.630
MLE	3.151 – 5.118	0.866 – 1.575	0.236	0.354	0.630
MLE	5.119 – 6.000 <sup>3</sup>	0.945 – 1.575	0.236	0.433	0.709

Table 8-32. MLM Standard Dimensions — Metric

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
MLM <sup>1</sup>	15.5 – 40.0	18.0 – 40.0	6.0 <sup>2</sup>	7.0	14.0
MLM <sup>1</sup>	40.1 – 60.0	12.0 – 40.0	6.0 <sup>2</sup>	8.0	15.0
MLM <sup>1</sup>	60.1 – 80.0	16.0 – 40.0	6.0	9.0	16.0
MLM	80.1 – 130.0	22.0 – 40.0	6.0	9.0	16.0
MLM	130.1 – 152.4 <sup>3</sup>	24.0 – 40.0	6.0	11.0	18.0

<sup>1</sup> Shaft diameters under 1.575" (40 mm) and cross-sections under 0.433" (11 mm) have standard inboard oil splash grooves.

Note: Cross-Section = (Bore – Shaft) / 2

<sup>2</sup> May be larger for small cross-sections. Consult factory for dimensions.

<sup>3</sup> Contact factory for requirements outside of standard dimensions listed above.

**Important:** For a listing of popular sizes, see Appendix F.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### MN — Flush Mount Millennium Design

Retain: Grease and oil splash (operating oil level in cavity between seal and bearing must be below inboard oil drain-back port of seal)

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Gearboxes, motors, pumps, mixers, turbines, blowers and custom equipment

### Technical Data

Total Eccentricity: 0.010" (0.25 mm)

Shaft Speed: Up to 7,000 fpm (35 m/s)

Pressure: 0 psi/bar

Temperature Range: -40 to 400 °F (-40 to 204 °C)

Axial Movement: 0.010" (0.25 mm)  
Special designs up to 0.100" (2.55 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Bronze

Optional: 302 SS, 304 SS, 316 SS, Carbon Steel

### O-Ring Material

Standard: FKM

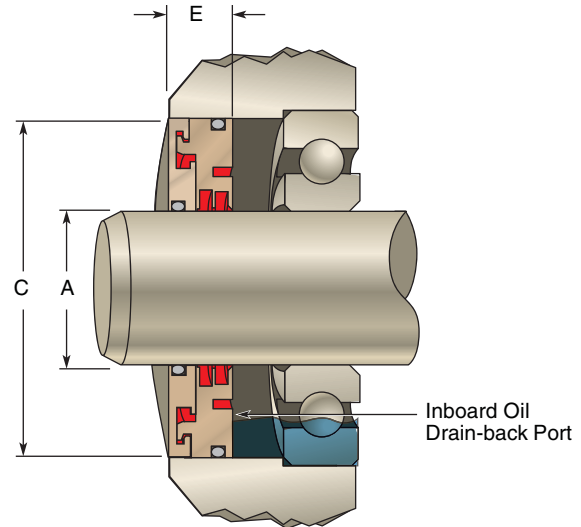
Optional: NBR, FDA silicone, EPDM, Atlas®

**Table 8-33. MN Mounting and Lubrication**

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	NR*	Y	Y	Y
Vertical Down	Y	Y	N	Y

\* Not recommended (NR). If contaminant level is heavy see ML Profile on **Page 8-29**.

### Dimensions — MN Profile



**Table 8-34. MNE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"E" In Bore Depth
MNE <sup>1</sup>	0.610 – 1.575	0.748 – 1.575	0.551
MNE <sup>1</sup>	1.576 – 2.362	0.748 – 1.575	0.591
MNE <sup>1</sup>	2.363 – 3.150	0.748 – 1.575	0.630
MNE	3.151 – 5.118	0.866 – 1.575	0.630
MNE	5.119 – 6.000 <sup>2</sup>	0.945 – 1.575	0.709

**Table 8-35. MNM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"E" In Bore Depth
MNM <sup>1</sup>	15.5 – 40.0	19.0 – 40.0	14.0
MNM <sup>1</sup>	40.1 – 60.0	19.0 – 40.0	15.0
MNM <sup>1</sup>	60.1 – 80.0	19.0 – 40.0	16.0
MNM	80.1 – 130.0	22.0 – 40.0	16.0
MNM	130.1 – 152.4 <sup>2</sup>	24.0 – 40.0	18.0

<sup>1</sup> Shaft diameters under 1.575" (40 mm) and cross-sections under 0.433" (11 mm) have standard inboard oil splash grooves.  
Note: Cross-Section = (Bore – Shaft) / 2

<sup>2</sup> Contact factory for requirements outside of standard dimensions listed above.

**Important:** For a listing of popular sizes, see **Appendix F**.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### FS-360 — Flanged Flooded Design

Retain: Grease, oil splash, oil mist or oil flooded

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Ideal for equipment used in food processing or subjected to frequent wash down where positive oil retention is required. Flooded oil or severe splash retention for gearboxes, motors, pumps, mixers, cooling towers, aerators and custom equipment

### Technical Data

Total Eccentricity: 0.003" (0.08 mm)

Shaft Speed: Up to 5,000 fpm (25 m/s)<sup>1</sup>

Pressure: 5 psi (0.344 bar)

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.003" (0.08 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE and SS Sleeve

Optional: Food grade PTFE and SS Sleeve, Anti microbial PTFE and SS Sleeve, FDA 3A PTFE and SS Sleeve

### O-Ring Material

Standard: FKM

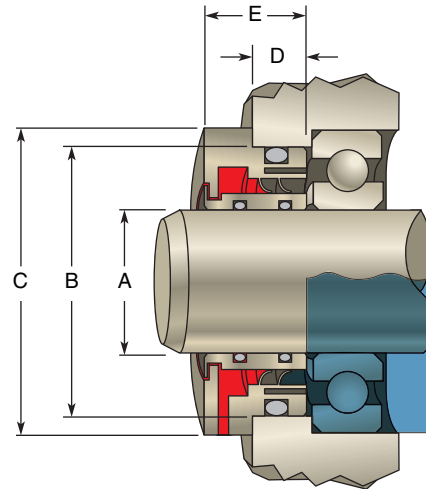
Optional: NBR, FDA silicone, EPDM, Atlas®

**Table 8-36. FS-360 Mounting and Lubrication**

	Mounting		Lubrication		
	Position	Grease	Oil	Dry	
Horizontal	Y	Y	Y	Y	
Vertical Up	Y*	Y	Y	Y	
Vertical Down	Y	Y	Y	Y	

\* For Vertical Up, contact factory if contaminant level is high.

### Dimensions — FS-360 Profile



**Table 8-37. FSE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
FSE	0.500 – 3.000	0.750 – 1.500	0.250	0.313	0.688
FSE	3.001 – 6.000	0.750 – 1.500	0.250	0.375	0.750
FSE	6.001 – 10.000	0.874 – 1.500	0.250	0.438	0.813

**Table 8-38. FSM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" Flange Diameter = "B" +	"D" In Bore Depth	"E" Overall Seal Width
FSM	13.0 – 76.0	19.0 – 40.0	6.0	8.0	17.0
FSM	76.1 – 152.0	19.0 – 40.0	6.0	9.0	18.0
FSM	152.1 – 250.0 <sup>2</sup>	24.0 – 40.0	6.0	11.0	20.0

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> Contact factory for requirements outside of standard dimensions listed above. Note: Cross-Section = (Bore – Shaft) / 2

**Important:** For a listing of popular sizes, see **Appendix F**.

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# ProTech™ Bearing Isolators

## Profile

Catalog EPS 5350/USA

### FN-360 — Non-flanged Flooded Design

Retain: Grease, oil splash, oil mist or oil flooded

Exclude: Heavy water spray and dry contaminants from bearing cavity

Equipment: Ideal for equipment used in food processing or subjected to frequent wash down where positive oil retention is required. Flooded oil or severe splash retention for gearboxes, motors, pumps, mixers, cooling towers, aerators and custom equipment

### Technical Data

Total Eccentricity: 0.003" (0.08 mm)

Shaft Speed: Up to 5,000 fpm (25 m/s)<sup>1</sup>

Pressure: 5 psi (0.344 bar)

Temperature Range: -40 to 250 °F (-40 to 121 °C)

Axial Movement: 0.003" (0.08 mm)

Shaft/Bore: Tolerances: ± .002" (± .05 mm) Special designs available

### Seal Material

Standard: Proprietary PTFE and SS Sleeve

Optional: Food grade PTFE and SS Sleeve, Anti microbial PTFE and SS Sleeve, FDA 3A PTFE and SS Sleeve

### O-Ring Material

Standard: FKM

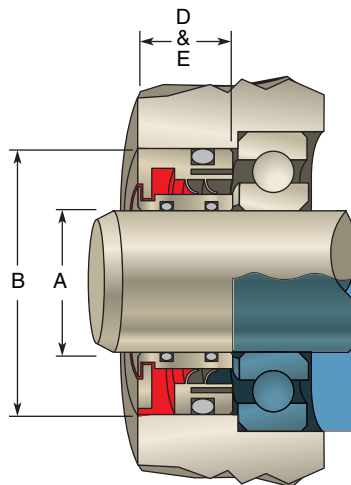
Optional: NBR, FDA silicone, EPDM, Aflas®

**Table 8-39. FN-360 Mounting and Lubrication**

Mounting	Lubrication			
	Position	Grease	Oil	Dry
Horizontal	Y	Y	Y	Y
Vertical Up	Y*	Y	Y	Y
Vertical Down	Y	Y	Y	Y

\* For Vertical Up, contact factory if contaminant level is high.

### Dimensions — FN-360 Profile



**Table 8-40. FNE Standard Dimensions — Inch/Fractional**

Type	"A" Shaft Diameter Range Inch	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" In Bore Depth
FNE	0.500 – 3.000	0.750 – 1.500	0.591
FNE	3.001 – 6.000	0.750 – 1.500	0.591
FNE	6.001 – 10.000	0.874 – 1.500	0.630

**Table 8-41. FNM Standard Dimensions — Metric**

Type	"A" Shaft Diameter Range Metric	"B" Bore Diameter Range Is Shaft Diameter "A" + Min-Max	"C" In Bore Depth
FNM	12.7 – 76.2	19.0 – 40.0	15.0
FNM	76.3 – 152.4	19.0 – 40.0	15.0
FNM	152.5 – 254.0 <sup>2</sup>	22.2 – 40.0	16.0

<sup>1</sup> Contact factory for speeds over 3,000 fpm (15 m/s).

<sup>2</sup> Contact factory for requirements outside of standard dimensions listed above. Note: Cross-Section = (Bore – Shaft) / 2

**Important:** For a listing of popular sizes, see **Appendix F**.

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